What is Claimed is:

[Claim 1]

A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a rotating device for rotating said rotary body in a reversibly bi-directional manner, said air flow control valve being further formed with a restricting portion at which restrictions in said two construction blocks each change in shape according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve.

[Claim 2]

A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a restricting portion at which restrictions in said two construction blocks change in shape so as to differ from each other according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve.

[Claim 3]

A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and

then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a restricting portion at which restrictions in said two construction blocks change in shape so as to differ from each other according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside;

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve; and

a recirculated-exhaust entry port is disposed in proximity to the restricting portion in said air flow control valve, and an exhaust recirculating mechanism is provided, so that controlled inlet air, sprayed fuel particles, and recirculated exhaust are mixed near a downstream side of the restricting portion.

[Claim 4]

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein two restrictions are constructed in a rotational direction of said air flow control valve.

[Claim 5]

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein, for one restriction in said air flow control valve, a rotational angle of said rotary body is set to ensure that an outlet direction of inlet air faces the vicinity of said fuel spraying port and that a high-speed air stream is supplied to the vicinity of said fuel spraying port and then made to collide with a fuel injection stream sprayed therefrom.

[Claim 6]

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein the opening in the first construction block and the opening in the second construction block are formed with different sizes, both openings being disposed so as to differ in a direction of opening.

[Claim 7]

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein said air flow control valve has parallel guide grooves, one in an axially circumferential direction o f a

rotational axis of said valve and the other in a longitudinal direction, the axially circumferential guide groove being formed with arc -like sealing members communicating between adjacent inlet passageways in order to block flow routes for the air movi ng therethrough, and the longitudinal guide groove being formed with bar-like movable sealing members to block flow routes for the air leaking from an upstream side of said valve to a downstream side thereof under a fully closed valve state.

[Claim 8]

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein said air flow control valve has parallel guide grooves in an axially circumferential direction of a rotational axis of said control valve, said flow cont rol valve further containing, therein, movable sealing members each capable of moving inside a guide groove in order to reduce the flow rate of the air leaking from an upstream side of said valve to a downstream side thereof; and wherein each movable sealing member is pressed in a reducing direction of an air flow route clearance by an air pressure difference occurring between the upstream and downstream of said control valve, depending on whether said control valve is fully closed or remains almost closed, and the movable sealing member thereby comes into contact with a mating surface to create a contact sealing effect for blocking the air flow route clearance, and when said air pressure difference is small, yields a variable sealing effect so as to mainly produce a non-contact sealing effect.

[Claim 9]

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein said air flow control valve has a deformed section whose cross-sectional area is particularly small; and wherein, depending on an air pressure difference occurring between an upstream and downstream of said control valve under a fully closed or almost closed valve state, a body of said valve, or particularly, its deformed section is deformed and hereby a sealing section provided in said valve is pressed in a reducing direction of an air flow route clearance, with the result that the sealing section thereby comes into contact with a mating surface to create a contact sealing effect for blocking the air flow route clearance around said valve, and when said air pressure difference is small, yields a variable sealing effect so as to mainly produce a non-contact sealing effect.

[Claim 10]

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein said arc-like sealing members and said movable sealing members installed in said air flow control valve are constructed of fluorinated resin, polyether-ether-ketone resin, polyimide resin, polyamide resin, polyphenylene sulfide resin, and a resin material formed mainly from these substances.

[Claim 11]

A mixture supply device for use in a multi-cylinder type of internal-

combustion engine, having an air flow control valve for adjusting the quantity of air taken in;

wherein:

inside an inlet passageway hole communicating with an opening in a restricting portion of said air flow control valve, a fuel spraying port of a fuel spraying mechanism is disposed downstream relative to the opening in said restricting portion; and

a high-speed air stream created by said restricting portion during starting operation of the internal-combustion engine is inducted from an outer periphery of said fuel spraying mechanism to said fuel spraying port and atomizes and carries fuel particles injected.

[Claim 12]

A mixture supply device for use in a multi-cylinder type of internal-combustion engine, having an air flow control valve for adjusting the quantity of air taken in, with said air flow control valve being changed in terms of cross-sectional shape of an opening in a restricting portion by a rotary motion;

wherein:

inside an air inlet passageway hole communicating with said opening, a fuel spraying port of a fuel spraying mechanism is disposed downstream relative to said opening in said restrictin g portion; and

during an air inlet stroke duration at the start of operation of the internal-combustion engine, an opening area of said restricting portion is controlled so as to increase, and a high-speed air stream created by said

restricting portion is inducted from an outer periphery of said fuel spraying mechanism to said fuel spraying port, atomizes fuel particles injected, and carries the atomized fuel particles by means of a quantitatively increased air stream.

[Claim 13]

A mixture supply device for use in a multi-cylinder type of internal-combustion engine, having an air flow control valve for adjusting the quantity of air taken in, with said air flow control valve adjusting the quantity of air by being changed in cross-sectional shapes of openings in restricting portions by a rotary motion;

wherein:

said openings are of a convex shape, with the opening at a smaller-area side being disposed so as to be positioned inside an air inlet passageway hole in which is contained a fuel spraying port of a fuel spraying mechanism, and the opening at a larger-area side, positioned outside the air inlet passageway hole; and

during an air inlet stroke duration at the start of operation of the internal-combustion engine, control is provided in order for the smaller-area opening to be changed to the larger-area opening, and a high-speed air stream created by said corresponding restricting portion is inducted from an outer periphery of said fuel spraying mechanism to said fuel spraying port, atomizes fuel particles injected, and carries the atomized fuel particles by means of a quantitatively increased air stream.